



Development of novel PDMS elastomers for dielectric electroactive polymers (DEAPs)

Bahrt, Frederikke; Daugaard, Anders Egede; Hvilsted, Søren; Skov, Anne Ladegaard

Publication date:
2013

Document Version
Publisher's PDF, also known as Version of record

[Link back to DTU Orbit](#)

Citation (APA):
Bahrt, F., Daugaard, A. E., Hvilsted, S., & Skov, A. L. (2013). *Development of novel PDMS elastomers for dielectric electroactive polymers (DEAPs)*. Abstract from EPF 6th summer school, Gargnano, Italy.

General rights

Copyright and moral rights for the publications made accessible in the public portal are retained by the authors and/or other copyright owners and it is a condition of accessing publications that users recognise and abide by the legal requirements associated with these rights.

- Users may download and print one copy of any publication from the public portal for the purpose of private study or research.
- You may not further distribute the material or use it for any profit-making activity or commercial gain
- You may freely distribute the URL identifying the publication in the public portal

If you believe that this document breaches copyright please contact us providing details, and we will remove access to the work immediately and investigate your claim.

Development of novel PDMS elastomers for dielectric electroactive polymers (DEAPs)

Frederikke Bahrt (frbah@kt.dtu.dk), Anders E. Daugaard, Søren Hvilsted and Anne Ladegaard Skov

Danish Polymer Center, Department of Chemical and Biochemical Engineering, Technical University of Denmark, Building 227, 2800 Kgs. Lyngby, Denmark

Dielectric electroactive polymers (DEAPs) are polymeric network systems that can be used to convert an electrical input to mechanical deformation of a polymer. DEAPs can be applied as actuators, sensors and generators due to their ability to exhibit a change in size and shape when an external voltage is applied as well as generate electrical energy when the material is exposed to mechanically induced deformations. DEAPs are normally constructed from thin filled elastomer films sandwiched between two compliant electrodes. The working principle of a DEAP actuator can be seen in Figure 1.

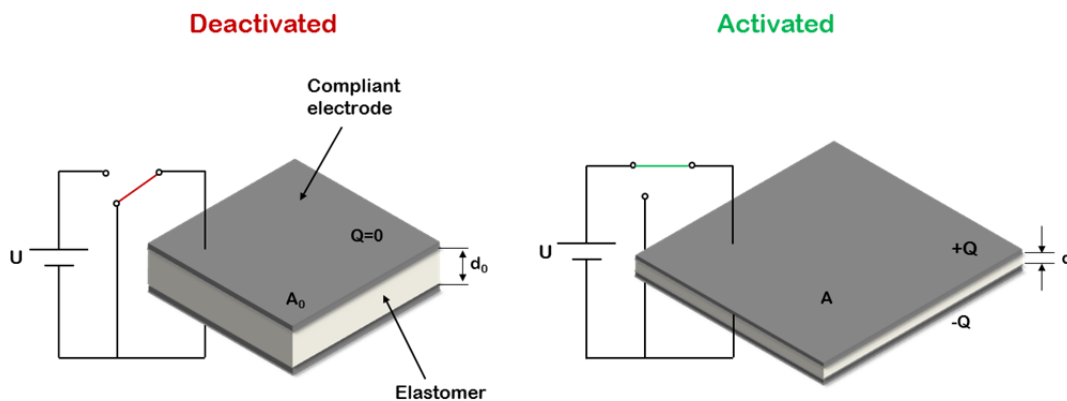


Figure 1: DEAP actuator working principle. When a high DC voltage is applied to the electrodes, the electrostatic pressure squeezes the elastomer film in thickness and the film is expanded in planar directions. When the external voltage is switched off, the elastomer film returns to its original shape.

Polydimethylsiloxane (PDMS) is one of the most used materials for DEAP applications due to its good thermal stability, high efficiency and fast response. This work presents new functional PDMS materials for DEAP applications with increased dielectric permittivity. The permittivity is enhanced by grafting of functionalities such as dipoles to a novel silicone compatible cross-linker. Incorporation of functionality at the cross-linking point allows for controlled and well distributed modification of the PDMS network. Even very small loadings, e.g. 0.5 wt%, of incorporated dipoles have led to a large increase in the dielectric permittivity.